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NEW USSR THERAPEUTIC AGENTS

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An extensive and entirely modern pharmaceutical industry has been created in the USSR as a result of the Stalin Five-Year Plans. Adequate domestic pharmaceutical production eliminated the necessity of importing foreign products. In bringing about this state of self-sufficiency, worthwhile achievements of foreign pharmacology were assimilated and adapted. However, some medicinals which are widely advertised by foreign firms producing them are only of questionable quality. To surpass foreign pharmacological science, both in theory and practice, it became necessary to develop new, original therapeutic agents. Some recent USSR accomplishments along these lines are cited below.

As a result of efforts to find a vasodilative agent which would aid in the treatment of high blood pressure, dibasol was synthesized by a group working under the direction of Prof B. A. Poray-Koshits. After successful pharmacological and clinical tests, it was introduced into practice. The impetus to this development was given by the increased incidence of hypertension after the war, particularly among the citizens of Leningrad, as an after effect of the siege of that city. Dibasol was intended to be a substitute for papaverine, a drug which is in short supply in the USSR. Its synthesis was based on a comparative study of the chemical constitution of papaverine and several other vasodilative agents, a study which led to the conclusion that a certain very definite atomic grouping is common to all of these agents. It is of interest that in the course of pharmacological examination the effect of dibasol was tested on the coronary arteries of isolated human hearts perfused with a circulating nutrient solution, according to a procedure developed by Prof N. P. Kravkov. One of the advantages of Kravkov's technique is that various organs of dead patients who suffered from some definite disease (particularly a disturbance of the function of blood vessels) can be used.

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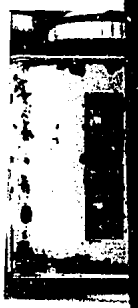

Dibasol was found to be very effective as a vasodilative agent. In addition to this, Prof N. V. Lazarev and Dr Rozin discovered that it exerts a stimulating effect on the central nervous system and strengthens spinal reflexes. After the discovery of this effect, which suggested beneficial action in conditions involving weakened spinal reflexes, flaccid paralysis, and partial paralysis, dibasal was subjected to clinical investigation from this viewpoint at the Clinic of Nervous Diseases, Naval Medical Academy imeni S. M. Kirov (a clinic which is directed by A. V. Triumfov Corresponding Member of the Academy of Medical Sciences USSR) and a number of other clinics specializing in this field. The neuropathologists established in the course of the investigation in question that dibasol does exert a beneficial effect in this class of diseases, and that it is particularly effective in paralyses occurring after infectious poliomyelitis (infantile paralysis). The stimulating effect of dibasol on the nervous system supplements the vasodilative action of this drug when it is used to treat hypertension and results in alleviation of pain in the region of the heart, relief from headaches, improvement of disturbances of vision, and elimination of other symptoms, particularly the severe ones which occur during the so-called hypertonic crises.

The valuable properties of dibasol thus demonstrated resulted in its approval by the Pharmacological Committee of the Ministry of Public Health USSR. In 1950, it was released by one of the Leningrad plants. Distribution through pharmacies for general therapeutic use began after that.

Another example of the creative collaboration of Leningrad chemists and medical men is the development of the new USSR drug, called embikhin. Chemically, embikhin is a chloroethylamine, i. e., it belongs to the same class of substances as nitrogen mustards. The toxic effect of chloroethylamines is based on their ability to suppress the division of cells, particularly of rapidly growing cells. In using embikhin as a drug, this inhibiting effect is utilized for therapeutic purposes rather than for poisoning people. Embikhin was found to be effective in cancer and sarcoma, and it is particularly beneficial as a remedy for leukemia and lymphogranulomatosis.

Embikhin was released for medical use at about the same time as dibasol. Work on embikhin was begun in 1947. The question in regard to the synthesis of compounds of this class for medical purposes was raised for the first time by the chemist, Prof V. I. Nemets, who did the chemical work in that connection. Clinical testing, which led to the development of an original and effective method of applying embikhin, was carried out at the Institute of Oncology, Academy of Medical Sciences USSR, under the direction of Prof L. F. Lariyonov. In 1950, embikhin was approved by the Pharmacological Committee of the Ministry of Public Health USSR. At present, it is being supplied for use in clinics. Great care is required in the administration of embikhin to patients, because poisoning may ensue if an error is made in the dosage.

In the USSR, akrikhin (quinacrine) and bigumal have completely replaced imported quinine. As far as antitubercular chemotherapeutic agents are concerned, p-aminosalicylic acid and tibon, the latter synthesized at VNIKhFI (All-Union Scientific Research Chemicopharmaceutical Institute) became available in 1950. Tibon gives the best effect in the otherwise hard-to-cure tuberculosis of the throat, and it is also effective in tuberculous infections of the mucous membranes of the mouth, the intestine, and the bladder. There are indications that the best results from the administration of tibon are obtained when application of this drug is combined with streptomycin therapy.

In the field of antibiotics, USSR industry has completely mastered the production of penicillin, with a corresponding reduction in cost. A quantity of penicillin sufficient for one complete course of treatment (1 million units) cost 300 rubles in 1948, 100 rubles in 1949, and only 19 rubles in 1950. In

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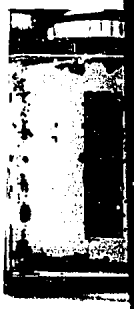

1950, Soviet scientists also developed methods for the production of streptomycin, an antibiotic the production process for which was kept secret by the US.

USSR scientists did not limit themselves to the extraction of antibiotics synthesized by fungi and bacteria. This type of production requires handling of very large quantities of liquid, particularly in the case of a "lazy" microorganism such as Streptomyces griseus, which produces only a very low concentration of the antibiotic. In the course of work on the synthesis of antibiotics, USSR scientists achieved a signal success in 1950. They succeeded in synthesizing the antibiotic synthomycin, which is identical with the natural antibiotic of a soil bacterium. The work in question was carried out by a group of chemists under the direction of V. A. Mikhalev and Skol'dinov at the Laboratory of Experimental Chemistry, VNIKhFI, headed by the Prof. F. S. Khanenya, Stalin Prize Laureate. Microbiologists of this laboratory established that synthomycin is effective against a number of pathogenic bacteria, particularly dysentery bacilli. Testing was carried out by subcutaneous injection into mice which had been infected with dysentery. While 100% of the infected control animals died, all the mice which were injected with synthomycin recovered. Tests on animals poisoned with dysentery toxin showed that synthomycin not only kills dysentery bacilli, but also counteracts their toxin

Clinical tests carried out at 11 therapeutic institutions in Moscow and Leningrad fully confirmed the results of animal experiments. Synthomycin was found to be the most powerful and reliable remedy for bacillary dysentery ever used. It is particularly effective in dysentery of children and has already saved thousands of lives. As distinguished from penicillin or streptomycin, synthomycin can be administered per os. At present, synthomycin has been released for medical use. The required quantities of this antibiotic are being produced by a Moscow chemicopharmaceutical plant.

The success achieved by treating dysentery with synthomycin is of great importance, because heretofore medicine did not have a really effective remedy for this widespread and serious disease. Most other antibiotics, including penicillin, are completely ineffective. Some sulfa drugs, including sulfidin /sulfapyridin/, were originally quite effective in treating bacillary dysentery, but sulfa drugs were introduced into medicine many years ago, so that the dysentery bacilli had time to develop a resistance against them. Dysentery bacilli do not develop a resistance against synthomycin. Furthermore, strains which exhibit a resistance to sulfa drugs nevertheless succumb to the action of this antibiotic.

There are reasons to believe that synthomycin will be found effective against other diseases besides dysentery. According to some communications, the natural antibiotic which is analogous to synthomycin exerts a therapeutic action in certain virus and rickettsia diseases. Presumably synthomycin will not differ from its natural analog in this respect.

The remedies mentioned above do not represent a complete list of all therapeutically active substances which have been added to USSR medicine within recent years. They are merely cited as examples. As far as the search for new antibiotics and development of methods for their production are concerned, a special scientific institute, located at Moscow and headed by Prof Z. V. Ermol'yeva, Stalin Prize Laureate /Institute of Penicillin and Other Antibiotics/, [redacted] is in charge of all work in this field.

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